

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
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Gaithersburg, Maryland 20899-2321

SRM Number: 1694a
MSDS Number: 1694a
SRM Name: Sulfur Dioxide in Nitrogen
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Sulfur Dioxide in Nitrogen

Description: This SRM mixture is supplied in a DOT 3AL specification aluminum (6061 alloy) cylinder with a water volume of 6 L. Mixtures are shipped with a nominal pressure exceeding 12.4 MPa (1800 psi) which provides the user with 0.73 m³ (25.8 ft³) of useable mixture. The cylinder is the property of the purchaser and is equipped with a CGA-660 stainless steel valve, which is the recommended outlet for this sulfur dioxide mixture. NIST recommends that this cylinder be used below 0.7 MPa (100 psi).

Other Designations: Sulfur Dioxide (sulfurous acid anhydride; sulfurous anhydride; sulfurous oxide; sulphur dioxide) in Nitrogen (dinitrogen) Gas Cylinder

Chemical Name	Chemical Formula	CAS Registry Number
Sulfur Dioxide	SO ₂	7446-09-5
Nitrogen	N ₂	7727-37-9

DOT Classification: Nonflammable Gas, UN1956

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration	Exposure Limits and Toxicity Data
Sulfur Dioxide	100 µmol/mol	ACGIH TWA: 2 mg/kg or 5 mg/m ³
		OSHA TWA: 5 mg/kg or 13 mg/m ³
		Human, Inhalation: LC _{LO} : 1000 mg/m ³ /10 min
		Human, Inhalation: TC _{LO} : 3 mg/m ³ /5 d
		Rat, Inhalation: LC ₅₀ : 2520 mg/m ³ /1 h
		Mouse, Inhalation: LC ₅₀ : 3000 mg/kg/30 min
Nitrogen	balance	simple asphyxiant

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Sulfur Dioxide	Nitrogen
Appearance and Odor: colorless with an irritating odor	Appearance and Odor: colorless and odorless
Relative Molecular Mass: 64.06	Relative Molecular Mass: 28.0134
Specific Gravity (@ -10 °C): 1.434	Density: 1.2506 g/L
Vapor Density (air = 1): 2.26	Vapor Density (air = 1): 0.967
Vapor Pressure (21 °C): 2538 mm Hg	Vapor Pressure (-196 °C): 760 mm Hg
Freezing Point: -73 °C	Freezing Point: -210 °C
Boiling Point: -10 °C	Boiling Point: -196 °C
Viscosity: not available	Viscosity (@ 27 °C): 0.01787 cP
Water Solubility (@ 0 °C): 22.8 %	Water Solubility (@ 20 °C): 1.6 %
Solvent Solubility: soluble in alcohol, acetic acid, sulfuric acid, ether, chloroform, acetone, aromatic carbides, benzene, liquid camphor, nitrobenzenes, sulfuryl chloride, and toluene	Solvent Solubility: soluble in liquid ammonia; slightly soluble in alcohol

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this sulfur dioxide/nitrogen mixture **DO NOT** exist. The actual behavior of the gas may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: Nonflammable

Autoignition Temperature: Not Applicable

Flammability Limits in Air (Volume %): **UPPER:** Not Applicable
LOWER: Not Applicable

Unusual Fire and Explosion Hazards: Cylinders may rupture under fire conditions. Nitrogen reacts with lithium, magnesium, and neodymium at high temperatures. Mixtures of ozone and nitrogen may be explosive. Titanium is the only element that will burn in nitrogen.

Sulfur dioxide is a negligible fire hazard when exposed to heat and/or flame.

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire. Sulfur dioxide forms sulfuric acid solutions with water.

Special Fire Procedures: Fire fighters should wear full protective clothing and self-contained breathing apparatus (SCBA) when this material is involved in a fire. Keep fire cylinders cool with water spray. If possible, stop the product flow.

SECTION V. REACTIVITY DATA

Stability: X **Stable** **Unstable**

Conditions to Avoid: Protect cylinders from physical damage. **DO NOT** allow the area where cylinders are stored to exceed 52 °C. **DO NOT** store material in poorly ventilated areas.

Incompatibility (Materials to Avoid): Sulfur dioxide is incompatible with combustible materials, metals, bases, oxidizing materials, halogens, metal carbides, metal oxides, peroxides, and reducing agents. Nitrogen reacts with metals and oxidizing materials.

See Section IV: "Fire and Explosion Hazard Data".

Hazardous Decomposition or Byproducts: Thermal decomposition of both sulfur dioxide and nitrogen will produce oxides of nitrogen. Sulfur dioxide dissolves in water to form corrosive sulfuric acid.

Hazardous Polymerization **Will Occur** X **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: X **Inhalation** X **Skin** **Ingestion**

Corrosive, high-pressure gas can cause rapid suffocation. May also cause eye, skin, and upper respiratory tract burns.

Acute Effects: The mixture can act as a simple asphyxiant by displacing air necessary for life. It is corrosive and irritating to the upper respiratory tract, skin, and eyes. Inhalation at high concentrations may be fatal due to spasm, inflammation, respiratory paralysis, and edema of the lungs, chemical pneumonitis, and pulmonary edema. Eye contact may result in irritation and inflammation of the conjunctiva and cornea and destruction of the eye tissue.

Chronic Effects: None Known

Medical Conditions Generally Aggravated by Exposure: Respiratory disorders are aggravated by sulfur dioxide.

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	<u> </u>	<u> X </u>

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with copious amounts of water for at least 15 minutes while removing contaminated clothing. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance if necessary.

Inhalation: Immediately remove victim to fresh air. If breathing has stopped, give artificial respiration by qualified personnel. If breathing is difficult, give oxygen. Lay victim with head and chest lower than hips to improve drainage of fluids from the lungs. Obtain medical assistance.

Ingestion: Not applicable

TARGET ORGAN(S) OF ATTACK: The eyes, skin, and upper respiratory tract.

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released: Proper protective equipment should be used, SCBA, in the event of a significant release. Evacuate all personnel, and ventilate the affected area. Stop leak if possible. Remove leaking cylinder to exhaust hood or a safe outdoor area. Remove from any source of heat.

Waste Disposal: Dispose of gas into an adequate amount of alkaline potassium permanganate solution. Dispose of non-refillable cylinders in accordance with federal, state, and local regulations. The cylinder is the property of the purchaser. **DO NOT** return the empty cylinder to the supplier.

Handling and Storage: Store in cool, dry, well ventilated areas away from combustibles. Protect cylinders from physical damage. Secure cylinders at all times to protect from falling. Keep valve protection cap on cylinders when not in use. Keep cylinders out of direct sunlight and away from heat sources. **DO NOT** allow the area where cylinders are stored to exceed 52 °C. Use suitable hand truck to move cylinders. Wear safety shoes when handling cylinders. Use adequate general and local exhaust ventilation to maintain concentrations below exposure limits and to avoid asphyxiation. A chemical safety shower and an eyewash station must be readily available. For protection of eyes, wear safety glasses.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the lab.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Source: MDL Information Systems, Inc., MSDS *Nitrogen*, 19 March 2003.
MDL Information Systems, Inc., MSDS *Sulfur Dioxide*, 19 March 2003.

Disclaimer: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references, however NIST does not certify the data on the MSDS. The certified value for this material is given only on the NIST Certificate of Analysis.